

NOTES ON AN APPARATUS FOR THE INDIVIDUAL BREEDING OF MOSQUITOES

BY
B. BLACKLOCK

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The apparatus here described is designed to facilitate the task of breeding out mosquitoes individually from any stage in which they happen to be at the time when they are collected, and in this way obtaining a record of the association of the various stages. It is a development of the breeding apparatus which Carter and Blacklock (1920) described, and its small size makes it easily portable and convenient for use in the tropics. By means of it, with a little trouble, a complete record of the stage originally obtained, the adult stage, and the intervening stages is possible. The parts of which the apparatus consists are glass capsules of suitable size, embedded in a wooden base, glass cylinders of which one end is covered with mosquito netting, and glass tubes for the collection of the casts at the various stages of development. It will be simplest to give the dimensions of the model actually in use; this has proved, in so far as mosquitoes are concerned, satisfactory, the mortality, whether of larvae, pupae or adults, being comparatively small. Modifications could easily be introduced which would render the apparatus suitable for observing the development of other insects in their aquatic stages.

The capsules. These are made from glass tubing, and are of the following dimensions:—Internal diameter, 11 mm.; internal height, 18 mm. They are of stout glass, about 1 mm. thick, rounded at the bottom like a test tube (fig. 1), and they fit into holes drilled in the



FIG. 1.

wooden base at measured intervals. The depth of the hole bored is such that when a capsule is placed in it the edge of the capsule lies

flush with the surface of the board, and the width of the holes is such that it is possible with fine bladed forceps to lift the capsule out of the board. A small ring of plasticine can be used to fit the junction of the holes that are too large for the capsules.

The board. The wood used in making the board is hard and well seasoned so that it will not warp. The length is 30 cm., the width 11 cm., the depth 3 cm.; the holes are bored in three rows, the distance between the holes from each other in any row or between the rows being 2 cm. (fig. 2). In this manner it is possible to have

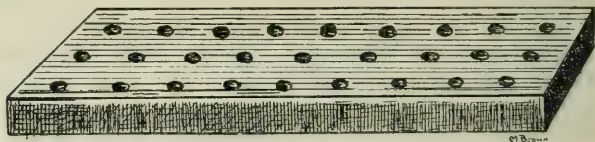


FIG. 2.

in each board twenty-seven capsules arranged in three rows of nine capsules each. In boring the holes, the first row is bored near the edge of the wood, leaving a rim of only about 0.5 cm. in front of them; the object of this arrangement will be explained later when describing the manner of using the apparatus.

The cylinders. These are made of glass, of similar thickness to that used for the capsules. The dimensions are:—Internal diameter, 15 mm.; height, 25 mm. It is essential that one end at least of the cylinder should be so cut that it will stand upright and make fair contact all round its edge with the board on which it stands, if one end is irregular, it should be used as the upper end; this end is in all cases covered with a small piece of mosquito netting, kept in position by a piece of string or two thin rubber bands (fig. 3).



FIG. 3.

As rubber is apt to deteriorate in the tropics and a band may break, it is necessary when using such bands to use two to ensure safety; string, however, answers the purpose quite satisfactorily, merely taking a little more time to fix on and take off. Fig. 4 gives a

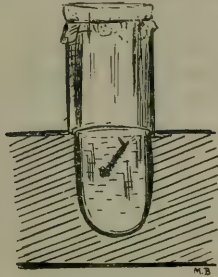


FIG. 4.

section of the cylinders in position covering the capsule embedded in the board.

Tubes for casts. These are made from glass tubing of an internal diameter of not less than 5 mm. and about 6 cm. in length, drawn to a blunt point at one end (fig. 5). When the larval and pupal



FIG. 5.

pelts have been placed in them they can be corked and waxed, or better, if so long as to permit of it, they can be drawn out in a small flame and sealed.

Method of use. The stages collected in the field, and from which it is desired to breed adults, are placed in a dish of such a size as to render it easy to ensure the isolation of individuals, and one by one these are transferred to the capsules, each into one capsule; this is filled with water and replaced in its position in the board, as evaporation occurs the fluid lost must be replaced daily to keep the water at the surface level. This is especially necessary in the case of anopheline larvae. The capsule is marked by a number written

on the board in front of it in pencil, the same number being entered in the book in serial order. The front of the board is that margin on which the narrower rim is left; this serves to identify the front, and is useful in practice also by leaving standing room at the back of each capsule for the accommodation of the cylinders when they are removed from their capsules. The capsule having been filled with water and replaced, a small portion of dried, powdered cockroach, or other suitable food material, is deposited on the surface of the water with a needle. Each day the capsule is examined at intervals, and when a cast skin is observed it is picked out with a needle or fine camel-hair brush and transferred to one of the tubes which have been described above, this being filled half full of preserving fluid, or the whole contents of the tube, including the larva, may be pipetted out with a wide bore pipette into a small porcelain dish and the cast skin recovered, the larva being replaced. Transfer by means of a pipette is apt to lead to difficulties owing to the fact that whereas the larval pelts usually fall to the bottom, the cast pupal skins usually float and may become stranded on the side of the pipette used. The date of the stage is noted in the record, the tube is numbered with the same number as the capsule and is retained for all material which is derived from that capsule. As soon as the pupal stage is reached one of the cylinders is placed in position over the capsule, and when the adult emerges into the cylinder this may be pushed carefully back off the capsule on to the board immediately behind it, in order to give the adult time to dry and expand. At the same time the pupal cast is removed and placed in its tube, which is then corked and waxed or sealed over a flame. When the adult is ready for pinning it is removed from the board by slipping a strip of thin, stiff paper underneath the cylinder containing it, chloroformed by sliding the cylinder on to a piece of paper moistened with chloroform, while the upper end of the cylinder is covered by the finger; when pinned it is labelled in the collecting box with the same number as the capsule from which it was derived and the tube containing its other stages. Before use again after one experiment the capsule is carefully swabbed out with a pledget of cotton wool, first with water, then with alcohol, and dried.

In this way it is possible to obtain in the majority of cases a very complete record of the stages from the time the individual was

collected; the apparatus is of value, not only as a simple means of associating stages and noting their duration in the laboratory, but also for isolating mosquitoes as they emerge if required for experimental purposes.

Precautions in use. Care is required with reference to the following points:—

- (1) Proper entry in the record of the number given to the capsule, pelt-tube and adult.
- (2) That one individual only is introduced into the capsule; this is especially necessary when dealing with young larvae or eggs.
- (3) That each pelt is removed as soon as it is shed.
- (4) That the tube containing pelts is well sealed if intended to be kept for future examination.